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6

REGION, CITY SIZE, AND INTERINDUSTRY DIFFERENCES IN EARNINGS

One way of testing some of the findings reported here and of extending the analysis is to examine the relation between region, city size, and interindustry differences in earnings. If earnings are higher in the non-South than in the South, and higher in large cities than elsewhere, then those industries that have an above-average proportion of their employment in the non-South, or in large cities, should show higher earnings than those that do not. Multiple regression analysis across industries permits testing of these hypotheses while allowing for the influence of other industry characteristics such as extent of unionization and size of employer. The following function was estimated:

$$\log X_0 = a + b_1 \log X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + u,$$

where

X_0 = average hourly earnings
X_1 = expected hourly earnings
X_2 = percentage of employment in the South
X_3 = percentage of employment in SMSA's with over 1,000,000 employed
X_4 = percentage of employed persons working in establishments in which more than half of the employees are covered by collective bargaining agreements (unionization)[20]
X_5 = percentage of employed in establishments with more than 250 employees (size of employer).

The number of industries included in the regression is 138; they represent the entire Census of Population industry list with the exception of agriculture, welfare and religious services, and a few "not specified" industries. Each industry is weighted in the regression by its total man-hours. Actual and expected earnings are entered in logarithmic form because the emphasis in this paper is on *relative* differentials.

[20] This variable is restricted to the range 20 to 60 per cent. All industries with unionization below 20 per cent are set equal to 20, and all those with unionization 60 per cent or over are set equal to 59.9. An analysis of the relation between earnings and unionization revealed that this is the most relevant range, although the coefficients for the other variables are unaffected by changes in the form of the unionization variable. See V. R. Fuchs's NBER unpublished manuscript on earnings in the service industries.

It should be noted that variables X_4 and X_5 are probably subject to appreciable measurement error because of data limitations. Furthermore, there is the possibility that the functional form chosen is not the most appropriate one. Another important qualification is that the results presented here describe the relation between the variables over the observed range and cannot unqualifiedly be extrapolated beyond these observed values.

The results are reported in Tables 16 and 17. The former shows the regional variable entered first and traces the changes that occur in the regression coefficient as the other industry variables are added. The latter does the same with the city-size variable entered first. The partial regression coefficients are shown for each variable with the t value shown immediately below in parentheses.[21] The third figure for each variable is the antilog of the regression coefficient minus one. This shows the percentage change in hourly earnings associated with a change of one unit in the independent variable.

We see that when the percentage in the South is the only independent variable, the regression coefficient is large and highly significant. The value of −.89 per cent implies that a decrease in hourly earnings of .89 per cent is associated with an increase of 1 percentage point in the share of an industry's employment in the South. The coefficient falls to less than half that amount in step 2, when account is also taken of labor force composition as measured by expected earnings. This confirms the results reported in Tables 2, 3, and 4, where the regional differential was sharply reduced by standardization for labor force composition. Step 3 shows that allowance for city size further reduces the regression coefficient for the percentage in the South, confirming the results shown in Table 11. The introduction of differences in extent of unionization (step 4) completely eliminates the negative relation between earnings and percentage in the South, and the fifth independent variable, size of employer, works in the same direction, but the positive relation is not statistically significant. In effect, the results suggest that the regional differential is completely explained by regional differences in labor force mix, city size, and extent of unionization.[22]

In Table 17, where the percentage in large SMSA's is examined, the

[21] The t value is the ratio of the regression coefficient to its standard error. Values over 1.98 indicate statistical significance at the .05 level of confidence and over 2.62 at the .01 level on a two-tail test.

[22] It should be noted that the unionization effect is open to several interpretations. It may reflect higher earnings in unionized industries for equal-quality labor, or it may reflect labor-quality differences associated with unionization that are not fully accounted for by the standardization for color, age, sex, and education.

TABLE 16

Results of Regressing the Logarithm of Average Hourly Earnings on the Percentage in South and Other Variables Across 138 Industries

Independent Variable	Step 1	Step 2	Step 3	Step 4	Step 5
X_2 Percentage in South					
reg. coeff.	-.0039	-.0017	-.0012	.0004	.0005
t	(4.60)	(-3.43)	(-2.02)	(.88)	(1.13)
effect of 1-unit change	-.89%	-.39%	-.28%	.10%	.12%
X_1 Log of expected earnings					
reg. coeff.		1.4701	1.4886	1.5043	1.4894
t		(17.00)	(17.23)	(22.32)	(22.29)
elasticity		1.47	1.49	1.50	1.49
X_3 Percentage in large SMSA's					
reg. coeff.			.0012	.0025	.0025
t			(1.80)	(4.66)	(4.77)
effect of 1-unit change			.28%	.58%	.58%
X_4 Unionization					
reg. coeff.				.0023	.0021
t				(9.35)	(7.52)
effect of 1-unit change				.51%	.49%
X_5 Size of employer					
reg. coeff.					.0003
t					(2.17)
effect of 1-unit change					.07%
$\bar{R}^2$	.128	.720	.725	.833	.837

Note: The zero order coefficients of correlation are:

$X_0 X_1 = .84$ $X_1 X_2 = -.26$ $X_2 X_3 = -.51$ $X_3 X_4 = -.08$ $X_4 X_5 = -.01$
$X_0 X_2 = -.37$ $X_1 X_3 = .03$ $X_2 X_4 = -.27$ $X_3 X_5 = .22$
$X_0 X_3 = .18$ $X_1 X_4 = .08$ $X_2 X_5 = .00$
$X_0 X_4 = .39$ $X_1 X_5 = -.02$
$X_0 X_5 = .08$

The original industry data are available upon request to the National Bureau.

TABLE 17

Results of Regressing the Logarithm of Average Hourly Earnings on the Percentage in Large SMSA's and Other Variables Across 138 Industries

Independent Variable	Step 1	Step 2	Step 3	Step 4	Step 5
X_3 Percentage in large SMSA's					
reg. coeff.	.0023	.0019	.0012	.0025	.0025
t	(2.10)	(3.29)	(1.80)	(4.66)	(4.77)
effect of 1-unit change	.53%	.44%	.28%	.58%	.58%
X_1 Log of expected earnings					
reg. coeff.		1.5379	1.4886	1.5043	1.4894
t		(18.34)	(17.23)	(22.32)	(22.29)
elasticity		1.54	1.49	1.50	1.49
X_2 Percentage in South					
reg. coeff.			-.0012	.0004	.0005
t			(-2.02)	(.88)	(1.13)
effect of 1-unit change			-.28%	.10%	.12%
X_4 Unionization					
reg. coeff.				.0023	.0021
t				(9.35)	(7.52)
effect of 1-unit change				.51%	.49%
X_5 Size of employer					
reg. coeff.					.0003
t					(2.17)
effect of 1-unit change					.07%
$\bar{R}^2$	.024	.719	.725	.833	.837

results are somewhat different from Table 16, and again confirm the findings reported earlier in this paper that the relation between earnings and city size is large, persistent, and cannot be explained by correlation between city size and other variables. The regression coefficient in step 1 implies that an increase in hourly earnings of .53 per cent is associated with an increase of one percentage point in the share of an industry's employment in large SMSA's. This coefficient is relatively unaffected by the introduction of expected earnings in step 2. It is reduced in step 3, but then rises beyond its original level in steps 4 and 5. Moreover, it is statistically significant throughout. Step 5 tends to refute the hypotheses that the city-size earnings differential can be attributed to a disproportionate share of highly unionized industries in large cities or to differences in size of employer.